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A satellite map of the Mediterranean region, showing the Greek peninsula, the Aegean Sea, and parts of the Middle East and North Africa. The map is oriented with North at the top.

# MATERIAL KOINAI IN THE GREEK EARLY IRON AGE AND ARCHAIC PERIOD

Edited by

*Søren Handberg & Anastasia Gadolou*



Monographs of the Danish Institute at Athens  
Volume 22





# MATERIAL KOINAI IN THE GREEK EARLY IRON AGE AND ARCHAIC PERIOD

*Acts of an International Conference at the Danish Institute at  
Athens, 30 January – 1 February 2015*

Edited by

*Søren Handberg and Anastasia Gadolou*



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# Scales of Ceramic Analysis on Naxos (Cyclades)\*

*Xenia Charalambidou, Evangelia Kiriatzki & Noémi S. Müller*

## Introduction

Archaeological research is conducted at a variety of analytical scales, which, as James R. Mathieu and Rachel E. Scott contend, are the scale(s) of analysis used in a research project in terms of its spatial, temporal and formal dimensions.<sup>1</sup> Analytical scale should in fact be considered its own independent variable and one that can vary and influence the researchers' interpretations.<sup>2</sup> Koinai in Classical archaeology usually refer to one aspect of analytical scales since koinai have been formulated and defined mainly based on regional studies. According to Michael Dietler (at this conference), they have been constructed on "... broad regional similarities in material culture that emerge out of prior, locally distinctive patterns..."<sup>3</sup> Especially for a complex material, such as pottery, which involves many technological choices in different steps of manufacture

(e.g., forming, tempering, firing, decoration etc.) we believe it is with a *bottom-up approach*, which integrates detailed site by site studies of production and consumption and examines both technological and stylistic aspects, that we will ultimately be able to fully appreciate patterns that appear on a larger regional level.

In this chapter, we discuss ceramic koinai – in terms of shared features in shape and decoration – as well as potting traditions and influences from different regions on the island of Naxos during certain periods of the early Iron Age (hereafter EIA) together with the first results of an ongoing study of pottery production and consumption on EIA Naxos, using an integrated approach combining macroscopic, petrographic and chemical (WD-XRF) analyses. For the purposes of this chapter we will focus primarily on pottery from the middle Geometric (MG) and late Geometric I (LG I) periods, examining both fine and coarse wares locally produced on Naxos.

The ceramics discussed in this chapter come from funerary contexts that, together with Naxian cult sites, form the most abundant source of information about material culture on the island during the EIA.<sup>4</sup> The preliminary results of the ongoing ceramic analyses presented here focus on pottery from the

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\* We gratefully acknowledge funding from the Institute for Aegean Prehistory (INSTAP) and the support of the Greek Ministry of Culture and Sports and more specifically the Ephorate of Antiquities of the Cyclades. We would also like to thank Dr. Photini Zaphiropoulou, Ephor Emerita of Antiquities, and Professor Karl Reber for allowing the selection of samples from the Plithos burial ground on Naxos to be analysed comparatively with the ceramic samples from the Naxian cemetery of Tsikalario and for valuable information on the pottery from Plithos.

1 Mathieu & Scott 2004, 1.

2 Mathieu & Scott 2004, 3.

3 Dietler *in this volume*, 21.

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4 See most recently Vlachopoulos & Charalambidou *forthcoming*. Evidence from EIA settlement contexts on Naxos remains scanty.



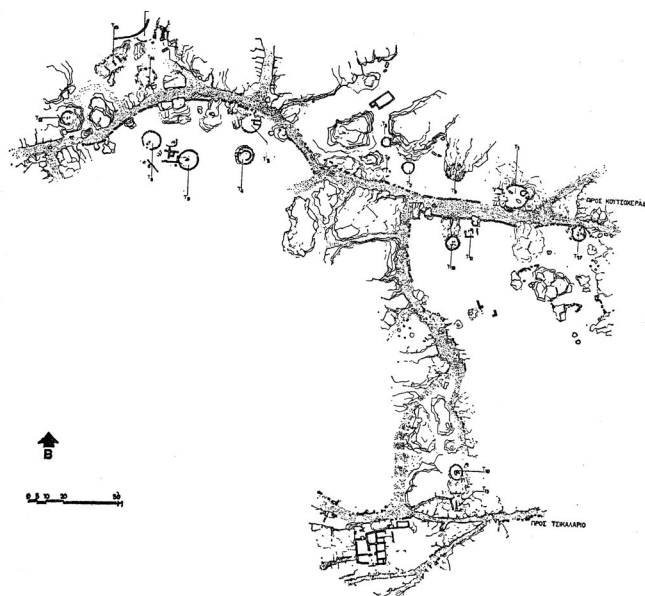
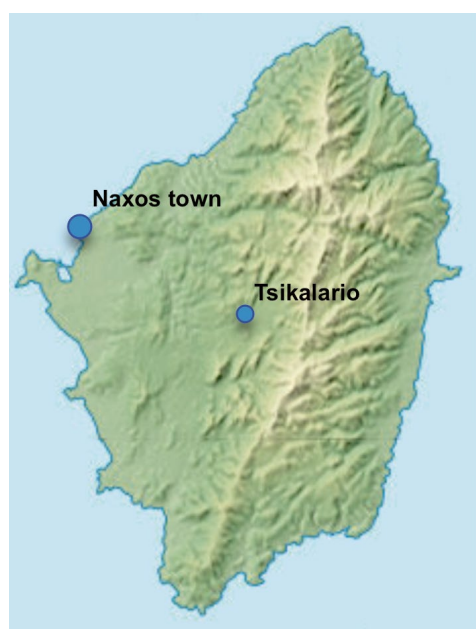


Fig. 1a. Map of Naxos with main sites mentioned in the text. Fig. 1b. Map of the Tsikalario cemetery in inland Naxos. (Zaphiropoulou 1983, 3, N.1).

inland tumulus cemetery in Tsikalario on Naxos (Fig. 1). The cemetery was excavated in the 1960s by Photini Zaphiropoulou and Christos Doumas and its ceramic material is currently under study by Xenia Charalambidou.<sup>5</sup> The most impressive funerary structures from Tsikalario, whose forms are unique to Naxos and the Cyclades, consist of circular and elliptical funerary tumuli. The grave goods from their interior date mostly to the MG II–LG I periods. Other types of burials and structures have been found at the site, such as a cist grave (no. 11) alongside a rectangular enclosure and a pit grave. Burials were found in the necropolis area, often close to the periphery of the tumuli, at least until the late Archaic or early Classical period. A large number, about 400, of ceramic objects, both fine and coarse wares, have been recovered from the Tsikalario cemetery: these are mainly pottery but also include figurines, beads and loom weights.

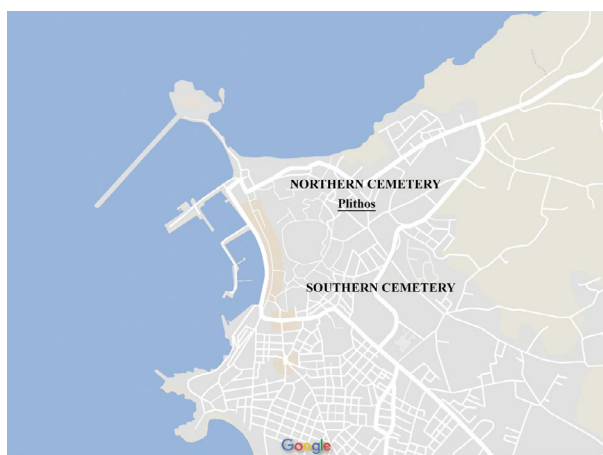
Ceramic material for comparative purposes has been sampled from the Plithos burial ground in the northern part of the modern coastal Naxos Town (Fig. 2), which comprises a significant part of the Northern Cemetery in the EIA. Its publication is in progress by Zaphiropoulou and Reber. The Plithos burial plot, by means of the excavations of Zaphiropoulou, yielded burials whose grave goods, mainly fine and coarse pottery wares, are dated primarily to the late Protogeometric (LPG) –late Geometric (LG) periods.<sup>6</sup> In addition to this, discussion in this chapter relevant to macroscopic observations refers also to material from the Southern Cemetery in Naxos Town (Fig. 2), in the area of the modern Gymnasium, published by Nota Kourou.<sup>7</sup> This publication comprises 60 vessels, mainly of the EG II – MG II periods.<sup>8</sup>

5 Zaphiropoulou 1983; 2001a, 285-92; 2001b, 7-11; 2008-9; Charalambidou 2008-9; 2011; 2010-12; 2013; 2017a.

6 Zaphiropoulou 2001a, 292-4; 2011; 2013; Reber 2011. See also Legaki & Mavroeidopoulos *forthcoming*, about more recent excavations at the Northern Cemetery by the Ephorate of Antiquities of the Cyclades.

7 Kourou 1999.

8 See also Coldstream 2008, 467.

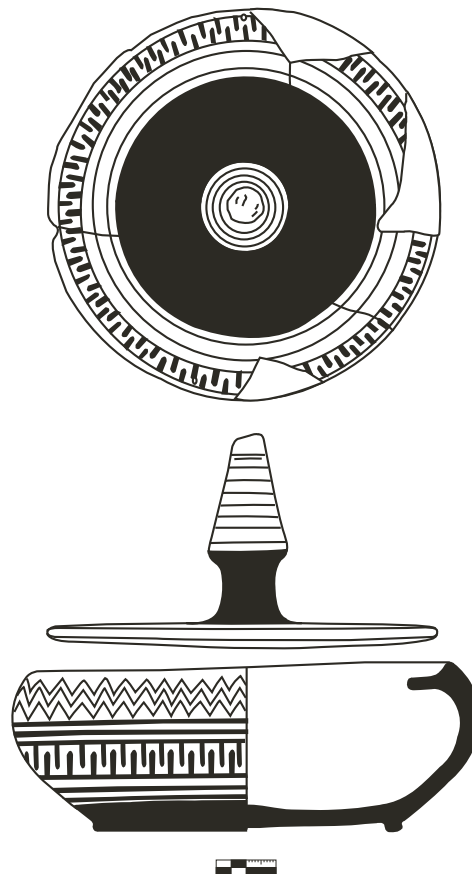


**Fig. 2.** The Plithos burial ground at the northern part of modern coastal Naxos town (part of the Northern Cemetery) and the Southern Cemetery in Naxos town. (Basemap: Google Maps).

## Macroscopic Observations

For the EIA Aegean, John Coldstream refers to *koinai* in pottery as far back as the 10<sup>th</sup> century BC with the dissemination of the Attic LPG style and from 850 BC onwards, when the Attic MG style becomes a common idiom for many regions of the Greek world, including the Cyclades.<sup>9</sup> In all instances, Coldstream's references to *koinai* concerns fine painted wares (no reference was made to coarse wares) and he refers to these two broad *koinai* (of the LPG and MG periods) in terms of shared features in shape and decoration. He also argues that in the second half of the 8<sup>th</sup> century BC a sudden movement away from uniformity towards the emergence of many distinct local styles becomes evident, although certain regions such as the Cyclades still borrow ideas from Attica, especially in the early part of the LG (i.e., the LG I period).<sup>10</sup>

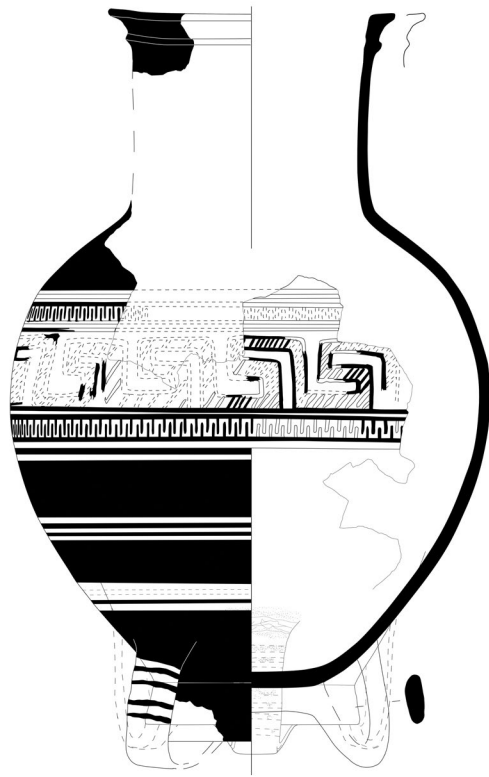
Naxian MG (to LG I) fine wheelmade painted wares exhibiting Attic influences appear both in



**Fig. 3a–b.** Flat pyxis from Tsikalario (outside Cist Grave 11), inv. no. 3881 (Photo: H. Iliadis. Drawing: X. Charalambidou).

<sup>9</sup> Coldstream 1983, 18; 2008, 165–71.

<sup>10</sup> Coldstream 1983, 20.



**Fig. 4a–b.** Closed vessel (amphora or pithoid vessel without handles) from Tsikalario (Tumulus 6, interior), inv. no. 3848. (Photo: H. Iliadis. Drawing: B. Konnemann).

coastal Naxos Town<sup>11</sup> and the Tsikalario cemetery in inland Naxos (e.g. Fig. 3 [MG I]; Fig. 4 [MG II-LG I]; see also Table I)<sup>12</sup> strengthening Coldstream's argument of an Atticising koine in the Cyclades including Naxos. According to Kourou, Attic elements do not always come directly from Attica, but often comprise indirect arrivals impacted by the Atticising styles of workshops from other regions.<sup>13</sup> The factor that facilitated the transference of this koine on Naxos has to do with connections with Attica already evident in the arrival of Attic imports on the island at least as early as the LPG

period.<sup>14</sup> Nevertheless, as John Papadopoulos has stated, ceramic koinai do not reflect political koinai.<sup>15</sup> It is possible to think that this ceramic koine reflects choices made by the consumers who used these wares for various functions (funerary, cult and probably domestic) adopting the style and symbolism employed on these objects. Furthermore, it also becomes evident that, apart from vessels with strong Atticising features, there are examples in the Naxian pottery production that indicate eclecticism and these are usually characterised by a combination of elements belonging to different potting traditions. An example of this is several amphoriskoi from the Southern Cemetery whose shape follows

<sup>11</sup> Kourou 1999, especially 90-5, 204-5.

<sup>12</sup> Coldstream 2008, 468; Charalambidou 2008-9, 59-60.

<sup>13</sup> Kourou 1999, 91, 204.

<sup>14</sup> Kourou 1999, 183-98; 2015, 88-9.

<sup>15</sup> Papadopoulos 2014, 186.





Fig. 5a–b. Pyxis with globular body and rising handles from Tsikalario (Pit Grave 14, interior), inv. no. 3940. (Photo: H. Iliadis. Drawing: X. Charalambidou).



Fig. 6. Skyphos from Tsikalario (Tumulus 6, interior), inv. no. 3853. (Photo: H. Iliadis).

Sub-Protogeometric (SPG) styles but whose decoration is a mixture of Attic and SPG elements.<sup>16</sup>

Alongside the Attic influences and imports, stimuli and wares from other Aegean regions are also evident on Naxos. Euboean imported ceramic wares are also present from the PG, probably as early as the early Protogeometric (EPG) period.<sup>17</sup> The SPG style which flourishes among Euboean workshops is also evident – but not favoured – among Naxian workshops. The majority of these examples are found at the Plithos burial ground and they comprise Euboean imports as well as local imitations.<sup>18</sup>

There are also other vessel shapes which indicate influences from other Aegean workshops, such as two pyxides with globular body and rising handles from Tsikalario which probably derive from Argive-Corinthian pyxis types (Fig. 5; see also Table 1).<sup>19</sup> Furthermore, the skyphoi with deep body from Naxos, which appear both in coastal Naxos Town cemeteries and at Tsikalario (e.g. Fig. 6; see also Table 1), probably show affinities with Peloponnesian styles.<sup>20</sup>



Fig. 7. Tripod pithoid vessel from Northern Cemetery, inv. no. 6651, Naxos Town (Plithos burial ground). Courtesy of Ph. Zaphiropoulou and K. Reber.

16 Kourou 1999, 31-2, 206.

17 Kourou 1994, 281; 2015, 84-5, 89-92.

18 Kourou 1999, 97-9, 205-6; Reber 2011.

19 Coldstream 2003a, 90; 2008, 97, 119, 122; Charalambidou 2010-12, 161, fig. 9.

20 Kourou 1999, 57-8, 94; Coldstream 2003b, 343, A108; 2008, 169-70; Charalambidou 2010-12, 166.



**Fig. 8.** Tripod pithoid vessel from Southern Cemetery, Naxos Town. (Kourou 1999, pl. 52α–γ; Courtesy of N. Kourou).

Concerning the coarse wares, pithoid vessels with flat bases ('group a') or with a tripod foot ('group b') are a common form of storage and funerary vessels on Naxos thus far evidenced in EG, MG and (early?) LG contexts. In terms of similarities in shape and style, these wares can be assumed to form a local koine of pithoid forms. They seem to form a specialised class of pottery known thus far to have been used mainly in funerary contexts (probably as ash urns?). Whether these products were initially manufactured for the burial context, or whether they had a prior role in domestic contexts before being used for burial, is a question that has not been answered yet.<sup>21</sup>

21 Compare with the function of fine (pithoid) amphorae from another region (Euboea) in Charalambidou 2017c, 146 and *forthcoming* (b).



**Fig. 9.** Pithoid vessel with flat base from Tsikalario (Tumulus 10, interior), inv. no. 3858. (Photo: D. Nenova).

They appear both in Naxos Town in the Northern Cemetery (e.g. Fig. 7)<sup>22</sup> and in the Southern Cemetery (Fig. 8),<sup>23</sup> as well as in the Tsikalario necropolis (e.g. Figs. 9–11; examples in Table 2).

Naxian pithoid vessels are usually handmade with a slightly polished or compacted (lightly burnished) surface. The latter feature is mainly observed on pithoid vessels with flat bases found in the Tsikalario necropolis. There are also several pithoid vessels from Naxos Town's Northern Cemetery and one from the Tsikalario Cemetery (Fig. 10) which

22 Zaphiropoulou 2004, 414, fig. 3. See also Zaphiropoulou 2001a, 294, fig. 39 and examples in Table 2.

23 Kourou 1999, 25, 82–4, 203–4, pl. 52α–γ.





Fig. 10. Tripod pithoid vessel from Tsikalario (Tumulus 5), inv. no. 5093. (Photo: H. Iliadis).



Fig. 11. Tripod pithoid vessel from Tsikalario (outside Tumulus 6), inv. no. 3839. (Photo: H. Iliadis).

have a burnished surface.<sup>24</sup> The pithoid vessels with flat base are not decorated (e.g. Fig. 9), while the tripod pithoid ones (e.g. Figs. 7, 8, 11) – as well as other miscellaneous coarse shapes such as a ‘kalathoid vessel’ from Tsikalario<sup>25</sup> – often bear incised or impressed decoration or a combination of incised and impressed motifs. It is worth mentioning that two of the earliest known EIA Naxian iconographic subjects are found on coarse pithoid vessels: a tripod pithoid vessel from Plithos (Fig. 7) and a tripod pithoid vessel probably from a burial context which was discovered at the site of Agios Ioannis in inland

Naxos, in the vicinity of Apeiranthos.<sup>26</sup> On the vessel from Plithos schematically shaped animals are combined with a ship; the combination of animals and ship appears on fine ware vessels from other Aegean workshops such as a closed vessel of the SPG IIIa period from Lefkandi.<sup>27</sup> The early iconography of these coarse Naxian pots underscores their significance in funerary consumption and symbolism.

Apart from Naxos, the pithoid vessel shape without handles is known in the Geometric period from various Aegean regions such as Attica<sup>28</sup> and Euboea.<sup>29</sup> Very recently, Orlando Cerasuolo com-

24 Burnishing has been observed on small and medium-size vessels from Naxos (among the medium-size pots reported with burnishing are some unpublished amphorae from Grotta: Kourou 1999, 109-11, esp. 110) but it has not been mentioned before that burnishing was also applied on some of the Naxian pithoid vessels.

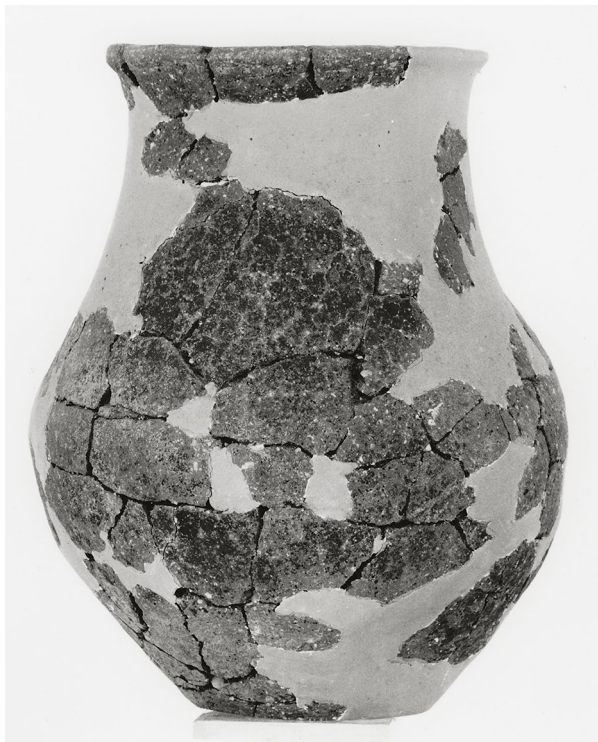
25 Charalambidou 2008-9, fig. 2a.

26 Charalambidou *forthcoming* (a).

27 Popham & Lemos 1996, pl. 107, Sq. XVI and pl. 126e.

28 In Attica without the tripod foot: e.g., Kourou 1999, 82.

29 Boardman 1952, 13, fig. 16. See also Blandin 2007, *passim*; Charalambidou 2017c and *forthcoming* (b); Gros 2012, 156-7, fig. 3; Whitbread & Livieratou 2012, 176-7, fig. 5.



**Fig. 12.** Pithoid vessel with flat base of small dimensions (Cist Grave 11, interior), inv. no. 3870. (Photo: H. Iliadis).

compares some Naxian coarse vessels with linear incised decoration with Euboean coarse pots with incised motifs ('Euboean incised pottery') following Boardman's recognition of the Euboean pots as a class of evidence.<sup>30</sup> The beginnings of this Euboean pottery class are dated to the PG period and it is reported to have become popular during the MG II – LG periods. Cerasuolo states that similarly decorated pottery was also found in Attica, the Cyclades, and the Chalcidice as well as other parts of the Greek world; closer links can be established between Euboea, the Cyclades and the Chalcidice.<sup>31</sup> Although there are similarities in form and decoration among these coarse vessels from the above mentioned regions, bringing to mind 'koinai' connotations, there

are also differences. For instance, on Naxos, incised motifs do not always appear on their own on the surface of coarse pots but can be combined with impressed motifs; a combination which is not favoured on Euboea. Autochthonous traditions certainly played a role in the manufacture and decoration of these Naxian coarse pots; function would have influenced form and size as well, such as in the case of a small Naxian pithoid vessel (Fig. 12) which was destined for a child burial in Cist Grave 11 in the Tsikalario cemetery.<sup>32</sup> Beyond style, differences in terms of petrography and chemistry are evident among the Naxian and Euboean fabrics.<sup>33</sup>

## Aim and Methodology of the Pottery Analysis

The aim of the petrographic and chemical analysis of the ceramic material from Tsikalario and comparative material from the Plithos burial ground is to:

1. Confirm and characterise, both compositionally and technologically, the fabric groups that macroscopically have been defined as local (Naxian).
2. Investigate the circulation of Naxian craft products on the island.
3. Corroborate the so far stylistic assignment of Naxian vs. imported pottery from the Tsikalario cemetery and examine the island's interconnections with other regions in the Aegean.

<sup>32</sup> Charalambidou 2010-12, 173-4; 2013, 83-4, fig. 7.

<sup>33</sup> The identification and characterisation of Euboean, more specifically Eretrian, fabrics, which differ from the Naxian ones, has been the focus of the project 'The Ceramic Industry of Eretria' undertaken by the Fitch Laboratory of the British School at Athens, in collaboration with the Swiss School of Archaeology in Greece; this project aims to shed further light on Eretria's role in the context of local and regional networks through a diachronic investigation of Eretrian pottery production (see Charalambidou et al. 2016; *forthcoming*).

<sup>30</sup> Cerasuolo 2017. On the first publication of Euboean incised pithoi see Boardman 1952, 13-4, fig. 16b-h.

<sup>31</sup> Cerasuolo 2017, especially 237-8, 239 (Table 1), 241.

*Fine/semifine wares*

Sample no	Inv. No.	Context	Vessel Type	Manufacture	Decoration	Date of context
TS11/09 (Fig. 4)	3848	Tsikalarío cemetery, Tumulus 6 (interior)	Amphora or pithoid vessel with loop foot	Wheelmade	Atticizing features. Main decoration (body): hatched meander, turning to left, in horizontal panel; below gear-pattern in horizontal panel	MG II–LG I
TS11/13	3828	Tsikalarío cemetery, Tumulus 6 (interior)	Amphora	Wheelmade	Main decoration (shoulder): concentric circles	MG II–LG I
TS11/18	3807	Tsikalarío cemetery, outside Tumulus 1, Burial 14	Amphoriskos	Wheelmade	Not preserved	Probably MG
TS11/27	3874	Tsikalarío cemetery, Cist Grave 11 (interior)	Pouring vessel	Wheelmade	Not preserved	MG II–LG I
TS11/28	3864	Tsikalarío cemetery, Tumulus 10 (interior)	Oenochoe	Wheelmade	Decoration preserved: zigzag in metope (neck); groups of horizontal bands (body)	MG II
TS11/30	3860	Tsikalarío cemetery, Tumulus 10 (interior)	Pouring vessel	Wheelmade	Monochrome, apart from at least one reserved band (?)	MG II
TS11/29	3806	Tsikalarío cemetery, outside Tumulus 1, Burial 14	Oenochoe	Wheelmade	Decoration preserved: two zigzags in metope (neck); groups of horizontal bands (body)	Probably MG
TS11/49	3934-5	Tsikalarío cemetery, Funerary context 14, Pyre 1	Skyphos	Wheelmade	Probably monochrome	Probably MG–LG I
TS11/50	3936	Tsikalarío cemetery, Funerary context 14, Pyre 1	Skyphos	Wheelmade	Probably monochrome	Probably MG–LG I
TS11/51	3908	Tsikalarío cemetery, Tumulus 6 (interior)	Skyphos	Wheelmade	Probably monochrome	MG II–LG I
TS11/52	3856	Tsikalarío cemetery, Tumulus 6 (interior)	Skyphos	Wheelmade	Probably monochrome	MG II–LG I
TS11/53	11000	Tsikalarío cemetery, Tumulus 10 (interior)	Skyphos	Wheelmade	Probably monochrome	MG II

TS11/54 (Fig. 6)	3853	Tsikalario cemetery, Tumulus 6 (interior)	Skyphos	Wheelmade	Monochrome	MG II–LG I
TS11/62	12157	Tsikalario cemetery, outside Tumulus 1	Spindle whorl	Handmade	Probably not painted	Probably MG II–LG I
TS13/13 (Fig. 5)	3940	Tsikalario cemetery, Pit grave 14 (interior)	Pyxis	Wheelmade	Decoration preserved: three zigzags in the central metope; star in the small side metope preserved (body)	MG
TS13/20	11075	Tsikalario cemetery, Cist Grave 11 (interior)	Cup	Wheelmade	Monochrome	MG II–LG I
TS13/25	3740	Tsikalario cemetery, Cist Grave 11 (interior)	Spindle whorl	Handmade	Probably parallel thin horizontal bands	MG II–LG I

**Table 1.** Macro-stylistic characteristics of fine/semifine Naxian wares from Tsikalario.*Coarse wares*

Sample no	Inv. No.	Context	Vessel Type	Manufacture	Decoration	Date of context
TS11/05	3846	Tsikalario cemetery, Tumulus 6 (interior)	Probably amphora	Handmade	Probably plain (no decoration)	MG II–LG I
TS11/34 (Fig. 9)	3858	Tsikalario cemetery, Tumulus 10 (interior)	Pithoid vessel with flat base	Handmade	Plain (no decoration)	MG II
TS11/36 (Fig. 10)	5093	Tsikalario cemetery, Tumulus 5	Tripod pithoid vessel	Handmade	Not preserved	Probably MG–LG
TS11/37 (Fig. 11)	3839	Tsikalario cemetery, outside Tumulus 6, Burial 13	Tripod pithoid vessel	Handmade	Incised decoration	Probably MG II–LG I
TS11/39	3906	Tsikalario cemetery, Tumulus 6 (interior)	Pithoid vessel	Handmade	Incised decoration	MG II–LG I
TS13/01 (Fig. 20)	3800	Tsikalario cemetery, outside Tumulus 6, Burial 9	Amphora	RKE	Plain (no decoration)	Probably MG II–LG I
TS13/02	3849	Tsikalario cemetery, Tumulus 6 (interior)	Amphora	Handmade	Plain (no decoration)	MG II–LG I
TS13/07 (Fig. 12)	3870	Tsikalario cemetery, Cist Grave 11 (interior)	Small pithoid vessel with flat base	Handmade	Plain (no decoration)	MG II–LG I
PL11/01	6613	Plithos burial ground	Tripod pithoid vessel	Handmade	Incised decoration	MG



PL11/02	7243	Plithos burial ground	Pithoid vessel (unknown if tripod or with flat base)	Handmade	Not preserved	MG
PL11/03	6763	Plithos burial ground	Pithoid vessel (unknown if tripod or with flat base)	Handmade	Incised and impressed decoration	Probably EG
PL11/04	7073	Plithos burial ground	Pithoid vessel (unknown if tripod or with flat base)	Handmade	Impressed decoration	Probably EG–MG
PL13/01	7231	Plithos burial ground	Pithos	Handmade	Impressed decoration	MG
PL13/02	10219	Plithos burial ground	Tripod pithoid vessel	Handmade	Not preserved	EG–MG (?)

**Table 2.** Macro-stylistic characteristics of coarse Naxian wares from Tsikalario and Plithos.

Eighty-nine pottery samples were selected from the Tsikalario cemetery ranging in date from the MG to the Archaic periods, in order to represent variability in vessel form, size, fabric and manufacture. EIA ceramic material from Plithos sampled for comparative purposes, as mentioned above, consists of 16 pottery samples.

This chapter focuses on 31 ceramic samples of fine and coarse wares from Tsikalario and Plithos (out of the 105 ceramic samples which have been sampled in total from both sites)<sup>34</sup> because the vast majority of these samples (with some exceptions included here for the purpose of comparison) can more securely be dated to the periods discussed in this paper, the MG–LG I periods, and are macroscopically assigned to Naxian production.

All samples were subjected to petrographic analysis with thin sections and chemical analysis at the Fitch Laboratory at the British School at Athens by the authors. Chemical analysis was carried out on ignited powdered samples prepared as fused glass

beads. Twenty-six major and trace elements were determined with a BRUKER S8-TIGER wave-length dispersive X-ray fluorescence spectrometer.

A summary of the macro-stylistic characteristics of the 31 ceramic samples analysed is provided in Tables 1-2.

## Remarks on the Geology of Naxos

The geology of Naxos exhibits diversity in its regions and can be divided into distinct units (Fig. 13).<sup>35</sup> The western part of the island (where coastal Naxos Town is located), is characterised by a large granodiorite-granite intrusion and numerous post-Pliocene alluvial deposits. At the centre of the island there is a migmatite dome, elliptical in shape (the Tsikalario cemetery was built in this dome), surrounded by a metamorphic complex. Towards the eastern coast

<sup>34</sup> The comparative material from Plithos presented here consists of a selection of coarse wares.

<sup>35</sup> About the geology of Naxos see: Jansen 1973; 1977; Urai *et al.* 1990; Hilditch 2007, 248; Vanderhaeghe *et al.* 2007 (evidence on the geology of the island presented here comes from these publications).



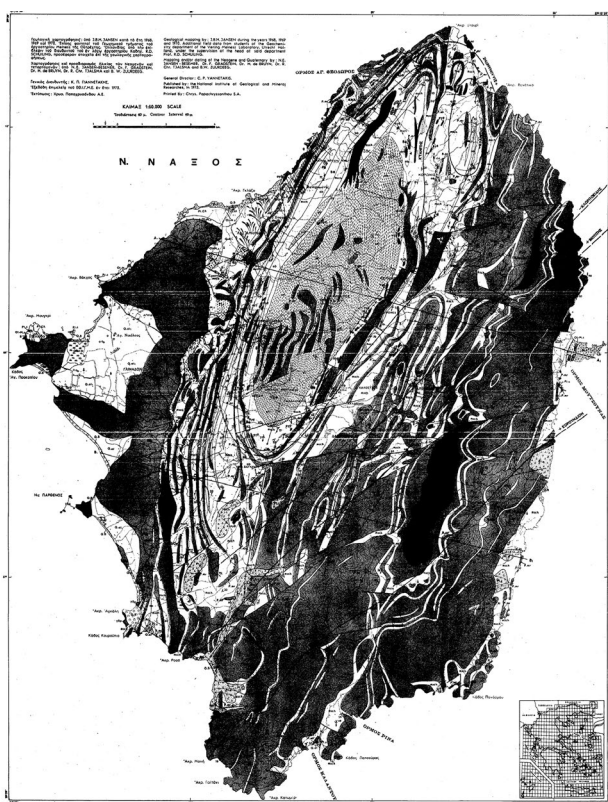


Fig. 13. Geological map of Naxos. (Jansen 1973).

lies the Pre-Permian Metamorphic Complex which consists of mica schist and gneisses, marbles, amphibolites, metamorphosed ultrabasic and gabbroic rocks.

According to Vanderhaeghe *et al.*, three tectonic-metamorphic units can be distinguished on the island.<sup>36</sup> The upper unit is composed of low-grade marble, schists and serpentinites that are overlain by dominantly detrital Cenozoic sediments. The middle and lower units are composed of high-grade metamorphic rocks. The middle unit is composed of a schists and marbles sequence containing mafic and ultramafic minerals. The middle unit is dominated by marbles at the top and by schists at the bottom. The lower unit is made of migmatites and marbles exposed in the core of the elliptical dome mantled by the metamorphic rocks of the middle unit.

## The Main Pottery Fabrics of the Analysed Samples: Preliminary Results and Discussion

Petrographic and chemical analysis, combined with macroscopic observations, indicate the use of different clay pastes along with different techniques, for the production of fine and coarse wares (Table 3 & Fig. 14). Fine wares are predominantly wheelmade, while coarse vessels are mainly handmade with the exception of certain coarse vessels probably of the MG II – LG I periods in which the use of a turntable is evident (see below: inv. nos. 3825 and 3800); this latter feature signals changes in manufacturing techniques that will become more evident in the subsequent LG II and Archaic periods.

### *Fine/semi-fine wares*

Table 1 lists MG–LG I fine/semi-fine ceramic samples from Tsikalario including Naxian vases of various stylistic affiliations, for example, the wheelmade painted closed vessel with Atticising features (Fig. 4; TS11/09: inv. no. 3848), the wheelmade painted pyxis with globular body and rising handles which shows influences from Argive-Corinthian types of pyxides (Fig. 5; TS13/13: inv. no. 3940) and monochrome wheelmade skyphoi with deep body probably being influenced from Peloponnesian workshops (e.g. Fig. 6; the skyphos TS11/54: inv. no. 3853).

Petrographic and chemical analysis of the Naxian fine and semi-fine wares of various stylistic affiliations indicated that their fabric is low calcareous, usually characterised by a high frequency of mica – mainly gold mica (biotite) and, more rarely, white mica, as well as quartz, feldspars, and, in smaller amounts, metamorphic rock fragments ranging mainly from schist to polycrystalline quartz (Fig. 15). There is internal variation among some of these samples, for example, in clay matrix or textural concentration features (e.g., sample TS11/13), which may be

	Main local (Naxian) fine/semifine (17 samples)		Main local (Naxian) coarse (10 samples)		Naxian coarse metamorphic TS11/37
	M	rsd (%)	M	rsd (%)	
Na <sub>2</sub> O (%)	1.66	10	1.80	19	0.93
MgO (%)	4.75	10	1.43	18	3.29
Al <sub>2</sub> O <sub>3</sub> (%)	19.57	5	17.06	4	16.69
SiO <sub>2</sub> (%)	50.13	5	63.35	4	59.53
P (ppm)	1891	75	728	108	572
K <sub>2</sub> O (%)	2.70	14	3.29	8	2.13
CaO (%)	3.18	26	1.50	26	1.36
TiO <sub>2</sub> (%)	1.13	12	0.66	10	0.76
V (ppm)	124	13	78	15	118
Cr (ppm)	217	15	81	32	260
Mn (ppm)	1280	25	479	42	1620
Fe <sub>2</sub> O <sub>3</sub> (%)	10.32	9	5.51	10	8.49
Co (ppm)	32	12	13	16	36
Ni (ppm)	139	18	55	50	192
Cu (ppm)	60	14	28	46	79
Zn (ppm)	145	12	61	20	130
Rb (ppm)	122	26	137	11	108
Sr (ppm)	148	18	201	23	95
Y (ppm)	37	16	27	22	22
Zr (ppm)	212	12	223	23	158
Ba (ppm)	495	16	536	6	381
La (ppm)	43	22	41	22	32
Ce (ppm)	77	17	84	27	60
Nd (ppm)	39	22	33	18	25
Pb (ppm)	83	98	48	44	43
Th (ppm)	23	35	24	30	12

**Table 3.** Chemical composition: average values (M) and relative standard deviations (rsd, in %) of local Naxian fine/semi-fine and coarse fabrics.

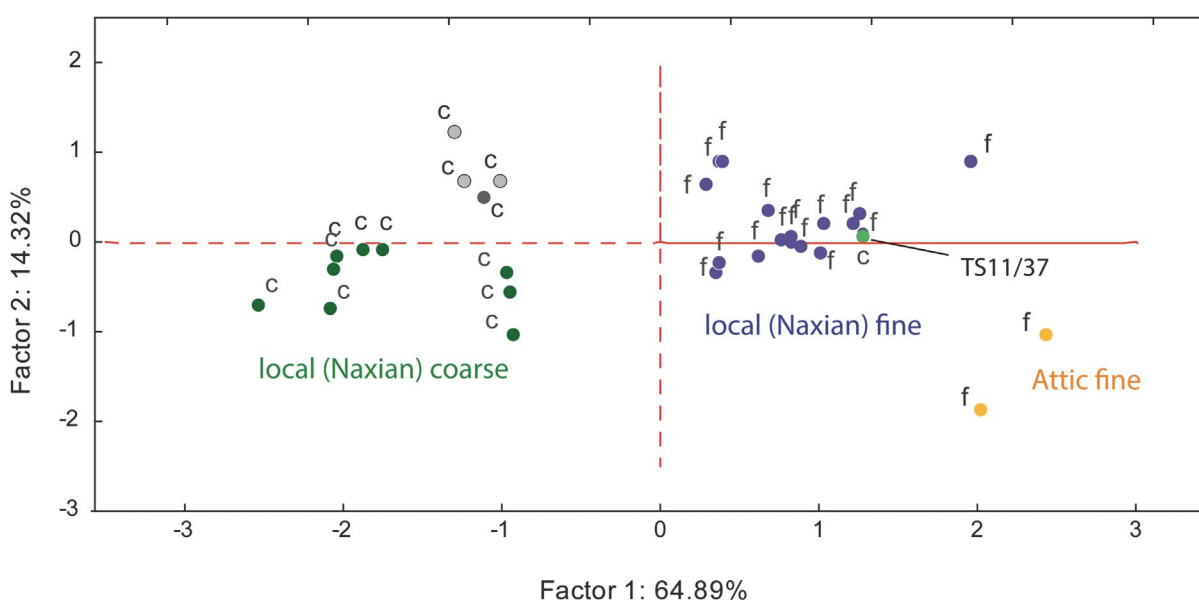


Fig. 14. Principal Component Analysis performed on log-ratio transformed data using Fe as divisor, excluding Na, P, Pb, Mn and Cu. (c: local [Naxian] coarse; f: local [Naxian] fine [/semi-fine]; two fine samples with secure Attic provenance are also included for comparison ['Attic fine']).

indicative of the existence of different workshops on the island. There are cases where stylistic distinctions are not reflected in the fabric. An example of this is the closed, painted vessel with Atticising features of Fig. 4 (sample TS11/09; Inv. No. 3848) which matches, petrographically and chemically, a monochrome skyphos (sample TS11/53; inv. no. 11000).

In terms of their elemental composition, these samples are low calcareous (average 3.2% CaO), but have a relatively high MgO (4.7%) and  $\text{Fe}_2\text{O}_3$  (10%) content (Table 3). Cr and Ni are around 220 and 140 ppm respectively. Samples TS11/27, 11/28 and 13/25 plot slightly apart from the main cluster in the PCA (Fig. 14); these samples have comparatively higher lanthanides and Th, and lower Cr and Ni values. Sample TS11/29 also has a somewhat different composition from the main cluster; specifically it shows slightly elevated Cr, Ni and Fe values and plots to the right of the main cluster in the principal component analysis.

Furthermore, the fine/semi-fine pottery sam-

plified and chemically, from the main fabric of analysed coarse wares from Tsikalario and Plithos (see below). On the other hand, there appears to be chemical similarities to the coarse sample TS11/37, which does not group with the main coarse fabric. Apart from this one sample, however, the differences between the main coarse and fine/semi-fine fabrics appear to reflect both technological and geological differences between ceramic pastes used in the manufacture of these Naxian fine and coarse wares.

There are few data from previous chemical analyses on Naxian fine/semi-fine pottery published, and methodological issues, not least the relatively few commonly measured elements do not allow any firm statement and make direct comparison difficult. With the available data, we can deduce that the first of Richard Jones' Middle/Late Cycladic groups from Rizocastelia on Naxos<sup>37</sup> might show some similarities to the fine/semi-fine EIA Naxian fabrics, while Late Cycladic cooking pots from Naxos appear clos-

<sup>37</sup> Jones 1978, addendum.

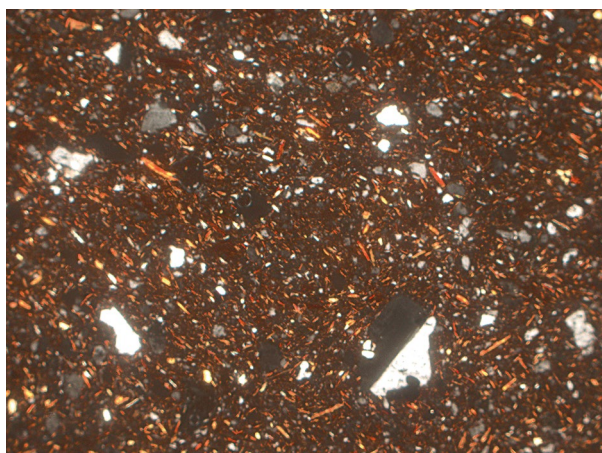


Fig. 15. Photomicrograph (XPL/field of view 2.8 mm) of fine/semifine closed vessel, inv. no. 3848; Fig. 4.

er in composition to the main local (Naxian) coarse group discussed below.<sup>38</sup> Relevant too is Grimanis *et al.*'s (1989) publication which focus on fine MG and LG Naxian pottery and poses questions similar to those of our project and concludes, based on the results of chemical analysis using NAA,<sup>39</sup> that with regard to fine wares, "... most probably a mixture of clays was used both in the Middle Geometric and the Late Geometric period, the ingredients of which varied depending on the workshop and the mixing conditions".<sup>40</sup>

### Coarse wares

For the coarse wares we have focused on certain categories of coarse products of the MG–LG (mainly LG I) periods with a few exceptions (where the vases analysed belong to the same tradition but may be

38 Kilikoglou 1988, 155.

39 Unfortunately the authors in Grimanis *et al.* 1989 did not publish compositional data; therefore comparisons with our project's fine/semi-fine wares' compositional data cannot be made.

40 Grimanis *et al.* 1989, 171.

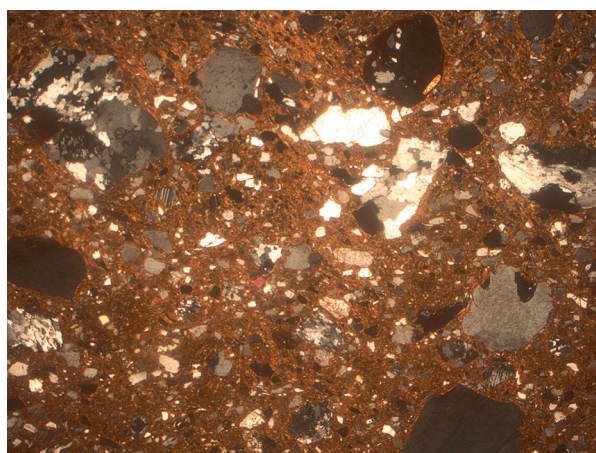


Fig. 16. Photomicrograph (XPL/field of view 5.5 mm) of coarse tripod pithoid vessel, inv. no. 5093; Fig. 10.

earlier: PL11/03, 11/04, 13/02): especially pithoid vessels with no handles, with flat bases or a tripod foot, one pithos (of the same form as the pithoid pots but of larger dimensions), and amphorae (Table 2). The latter shape (amphorae) was also included because it exhibits similarities in form with the pithoid vessels (although the amphorae have handles).

The main body of samples which contains pithoid vessels from Plithos and Tsikalario (PL11/01, PL11/02, PL13/01, TS11/34, TS11/36, TS11/39, TS13/07 and PL11/03, PL11/04, PL13/02) fall within the same main fabric group. EIA coarse vessels made from this coarse fabric include pithoid shapes without decoration with flat bases and of medium to large (e.g. Fig. 9) or of small dimensions (Fig. 12), tripod pithoid shapes (e.g. Fig. 10) which usually have decoration, as well as the pithos (see Table 2).

This is a coarse, low calcareous fabric (average CaO content 1.5%) (Figs. 16–18) that includes fragments of metamorphosed rocks (showing varying levels of metamorphic deformation) and granites, and associated minerals such as amphibole, epidote group minerals and sphene, with (TS11/36, TS11/39, PL13/01) or without volcanic rock fragments. The coarse and fine fractions contain significant quantities of quartz and feldspar grains (some including



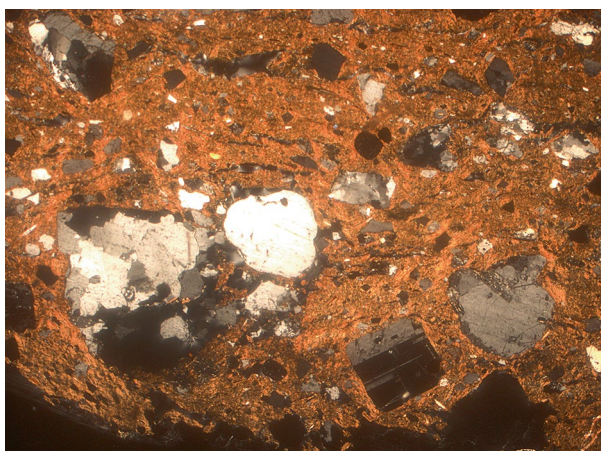


Fig. 17. Photomicrograph (XPL/field of view 5.5 mm) of coarse pithoid vessel, inv. no. 3858; Fig. 9.

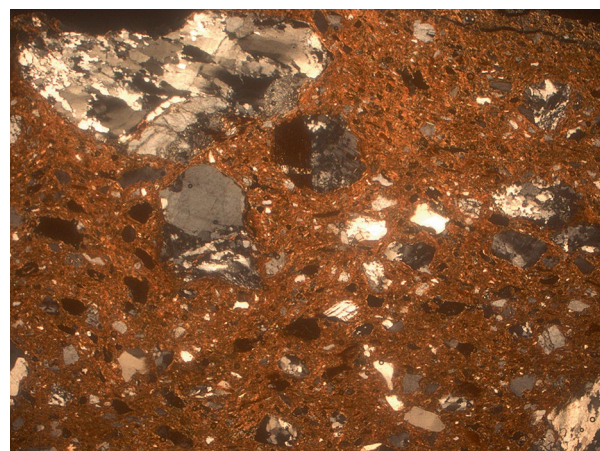


Fig. 18. Photomicrograph (XPL/field of view 5.5 mm) of (small) coarse pithoid vessel, inv. no. 3870; Fig. 12.

fresh, unweathered fragments of plagioclase) dissociated from the rock fragments, as well as gold (biotite) and white mica. Variations observed within this main Naxian coarse fabric likely reflect some heterogeneity in the sources of raw materials selected. This variation is stronger in samples PL11/03, PL11/04 and PL13/02 of which most or all may be earlier than the other samples; they contain larger inclusions of amphibole and epidote group minerals and do not include volcanic rock fragments.<sup>41</sup> Chemically, this fabric is distinct from the fine group in a number of elements, including lower average Cr (80 ppm) and Ni (50 ppm), Mg (1.3% MgO) and a lower Al:Si ratio. It shows relatively high internal variation in a number of elements (particularly Sr, but also Zr and to some extent the lanthanides) (Fig. 14).

This fabric shows close similarities with a well-known Naxian meta-granite fabric which is attested on the island from at least the Final Neolithic,<sup>42</sup> and is also attested, for example, in Naxian imported

vessels on Thera and Therasia throughout much of the Bronze Age.<sup>43</sup> Its source can probably be located within the dominating granite-granodiorite intrusion in the western region of the island.<sup>44</sup> Such similarities in fabric between Neolithic, Bronze Age and EIA ceramic wares may suggest that Naxian potters used similar types of raw materials for the production of certain categories of coarse wares over a very large span of time.

One sample in Table 2 does not fall within this main fabric group: TS11/37 of the tripod pithoid vessel (inv. no. 3839) from Tsikalario which was recovered from the periphery of Tumulus 6 (Fig. 11). While it is also low calcareous, it has distinctly higher Cr, Ni and Mg concentrations. Mineralogically, this fabric is also different from the other Naxian coarse pithoid vessels analysed thus far; it is characterised by (biotite+white mica) schist and polycrystalline quartz rock fragments and it also includes biotite, white mica and rare epidote group minerals (Fig. 19). This metamorphic fabric is compatible with the local geology of Naxos, especially in the

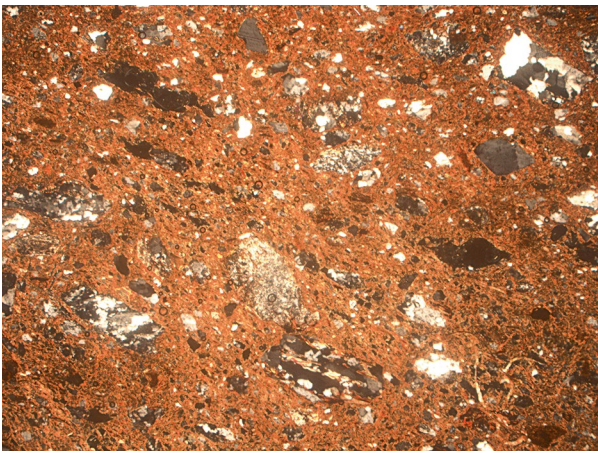
41 PL11/04 is decorated with impressed motifs and PL11/03 with incised and impressed motifs.

42 Vaughan 1989, 151-2, 157-8 (Metamorphic/Granitic Group); Hilditch 2007, 240-1; 2008, 228-34, 290-4 (Fabric D: Meta-granite); 2013, 475 (Fabric: Granite).

43 Thera: Müller 2009; Therasia: Kordatzaki 2015, 62-3 (Fabric Γ).

44 Hilditch 2007, 241, 248.

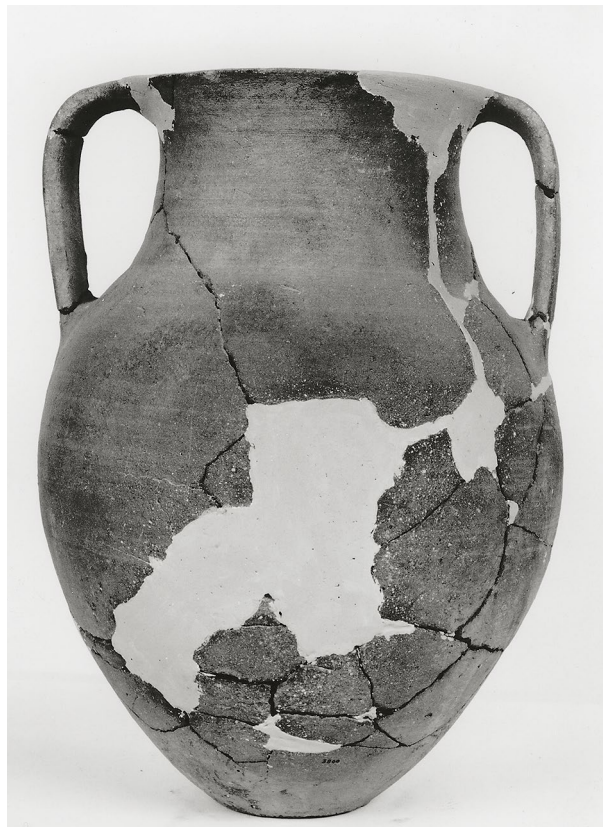




**Fig. 19.** Photomicrograph (XPL/field of view 5.5 mm) of coarse tripod pithoid vessel, inv. no., 3839; Fig. 11.

central and eastern parts of the island (see above),<sup>45</sup> and shows chemical similarities to the local fine/semi-fine fabric group (see Table 3 & Fig. 14).

Interestingly, the three samples of amphorae from Tsikalario (TS11/05, TS13/01, TS13/02) that were added to Table 2 for comparative purposes (to be compared with the fabric[s] of the pithoid vessels) have fabrics characterised by polycrystalline rock fragments but they are distinctly different, petrographically and chemically, from TS11/37 (inv. no. 3839) (chemically they show some similarities to the main fabric of pithoid vessels).<sup>46</sup> One of these samples (TS13/01) comes from an amphora (inv. no. 3800; Fig. 20) which, together with another (inv. no. 3825; Fig. 22) from the same context, provides evidence of a different manufacturing tradition than the Naxian handmade coarse vessels. One was found in the central area of Tumulus 6 (inv. no. 3825) and the other (inv. no. 3800) among the vessels from the exterior periphery of the same tumulus. These two amphorae are probably dated to the MG II–LG I periods. The date of the first vessel (inv. no. 3825) is more secure because it was found in the interior



**Fig. 20.** Amphora from Tsikalario (outside Tumulus 6), inv. no. 3800. (Photo: H. Iliadis).

of the tumulus that – based on its grave goods – has been dated to the MG II–LG I.<sup>47</sup> Inside this vessel, a MG II one-handled kyathos decorated with two pairs of hatched meander hooks was discovered.<sup>48</sup> The date of the latter vessel (inv. no. 3800) is roughly estimated on the basis of similarities in shape and forming technique with inv. no. 3825.<sup>49</sup> The amphora (inv. no. 3800; Fig. 20) is made of a low calcareous fabric characterised by the presence of polycrystalline rock fragments and includes minerals such as quartz, feldspar, gold mica (biotite), white mica and

<sup>45</sup> See also Hilditch 2007, 248.

<sup>46</sup> These samples are indicated in grey colour in Fig. 14.

<sup>47</sup> This tumulus probably belonged to a family/kinship group because it contained a significant number of storage vessels, most of which could have been used as ash urns, see Charalambidou 2011.

<sup>48</sup> About the date of this motif, see Coldstream 2008, 170.

<sup>49</sup> Charalambidou 2008-9, 62, fig. 5e–f; 2011, fig. 6a; 2010-12, 175-8, fig. 20.

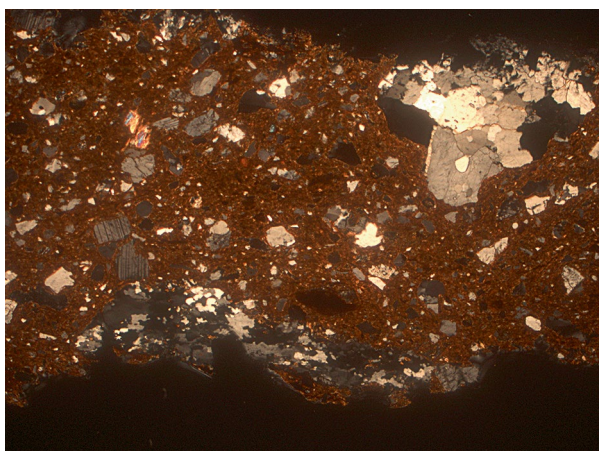


Fig. 21. Photomicrograph (XPL/field of view 5.5 mm) of coarse amphora, inv. no. 3800; Fig. 20.

rarely epidote group minerals and sphene (Fig. 21). The amphora (inv. no. 3825; Fig. 22) was not sampled for analysis, because it is a complete vessel. These vessels demonstrate evidence that they were coil built and formed with a wheel-fashioning method through the use of rotative kinetic energy (RKE).<sup>50</sup> They show similarities with Method 3 of Roux and Courty's typology, wherein coils are built by discontinuous pressures, without the help of RKE, while joining the coils and thinning and shaping the body is done with the help of RKE. The use of a rotational device can be seen clearly in the interior of these pots (e.g. Fig. 22b). These vessels are among the first indications so far of the use of RKE on coarse wares on Naxos during the EIA. Their forming technique contrasts with the vast majority of other MG II–LG I coarse handmade vessels from the interior of the tumulus. As mentioned above, the amphora inv. no. 3800 is petrographically and chemically different from the handmade coarse pithoid vessel inv. no. 3839 (TS11/37) that was found in the periphery of the same tumulus.

Summarising, the majority of handmade pithoid vessels analysed, from Tsikalario and Plithos, which either bear incised or impressed decoration or a

combination of both or no decoration at all, are associated with a main fabric that exhibits internal variation. Pithoid vessels, however, are not made exclusively in this fabric, since at least one such vessel among those that have been analysed from Tsikalario to this point in time was manufactured with a different – but in all likelihood also Naxian – clay recipe. During MG II–LG I periods two amphorae from the same context in Tsikalario were made using RKE demonstrating the existence of a different manufacturing tradition alongside coarse handmade pots. These two vessels may point to the beginning of the spread of the use of RKE in the Naxian system of pottery production especially from the LG period onwards (its use is common among LG-early Archaic cooking pots from Tsikalario).

## Concluding Remarks

From a stylistic point of view, local Naxian ceramic koinai can be seen on the island of Naxos in both fine and coarse wares. The Atticising features on fine wares accord with a more general Atticising tendency in the Cyclades, especially in the MG period; nevertheless, there are also other Naxian products influenced by different Aegean workshops that co-existed in the island's repertoire from the MG (and earlier). Autochthonous tradition in coarse wares is stronger, although connections among workshops that manufacture coarse pithoid vessels can be discerned between Naxos and other Aegean regions, especially Euboea. Local koinai on Naxos can be assumed primarily based on macroscopic observations – as mentioned above in terms of shared features in shape and decoration. There are also cases evidenced through the petrographic and chemical analysis in which stylistic distinctions, for example in fine wares, are not reflected in fabric. The fabric of Naxian fine wares from Tsikalario that have been analysed to this point in time is different, both petrographically and chemically, from the main fabric





Fig. 22. A) Amphora from Tsikalario (Tumulus 6, interior), inv. no. 3825. (Photo: H. Iliadis). The handles are embellished with horn-like terminals and a row of inverted Vs along the handles' spines. B) Evidence of the use of RKE in the interior surface of the body and base of the vessel. (Photo: X. Charalambidou).

of Naxian coarse wares. Divergent traditions are also evident in their manufacturing techniques.

The coarse tripod pithoid vessels with incised or impressed decoration (or both) from Plithos and Tsikalario (from the latter site see inv. no. 5093) analysed here share many similarities in fabric and were therefore likely produced in closely related workshops. But there is also evidence for the use of clearly different raw materials in the manufacture of this specialised class of vessels since at least one such vessel, a tripod vessel from Tsikalario (inv. no. 3839), was made using a distinctly different clay recipe. This indicates the existence of workshops producing these pots in different parts of Naxos.

The same or similar raw materials used for the majority of the pithoid vessels that have been analysed with incised/impressed decoration were also used for the production of the coarse pithoid vessels with a flat base. This evidence demonstrates that the existence of certain stylistic and morphological features in the 'group' of tripod pithoid vessels

with incised/impressed decoration and the 'group' of pithoid vessels with a flat base with no decoration does not mean sole use of raw materials for each 'group'. The possibility that some of the coarse pithoid vessels found in the Tsikalario necropolis were made in the western part of the island may indicate that various categories of products, including coarse wares, especially of specialised classes, circulated on the island and reached inland Naxos.

Furthermore, the two amphorae from Tsikalario mentioned above (inv. nos. 3800 and 3825) are among the first examples of Naxian pots that demonstrate evidence of the use of RKE and are indicative of manufacturing processes/transformations within the EIA Naxian system of pottery production.

More generally, this interdisciplinary research represents the first combined macroscopic, petrographic and chemical analysis project of EIA pottery on the island of Naxos. More samples from coastal and inland Naxos will be analysed in the future to explore relations between stylistic assignments

and fabric groups and the connections between the coastal and the inland part of the island during the EIA. In the present chapter we have focused on a selection of samples, ranging mainly from the MG to LG I periods, but we hope to have shown the wealth of information, for a study of production and consumption, offered by an integrated approach that considers both fine and coarse ware. It was our aim to discuss ceramic koinai on Naxos but also to move beyond stylistic assignments, to examine technology and consumption as well as processes/transformations in the Naxian system of pottery manufacture that seem to have an impact on later periods. We believe that it is only with such a bottom-up approach, which examines and integrates both technological and stylistic aspects that we will ultimately be able to fully appreciate the patterns that appear at a larger regional level.

## Abbreviations

EIA: Early Iron Age  
 PG: Protogeometric  
 EPG: Early Protogeometric  
 LPG: Late Protogeometric  
 SPG: Sub-Protogeometric  
 EG: Early Geometric  
 MG: Middle Geometric  
 LG: Late Geometric  
 RKE: Rotative Kinetic Energy

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